Interest Rate Risk and Bank Equity Valuations

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Introduction

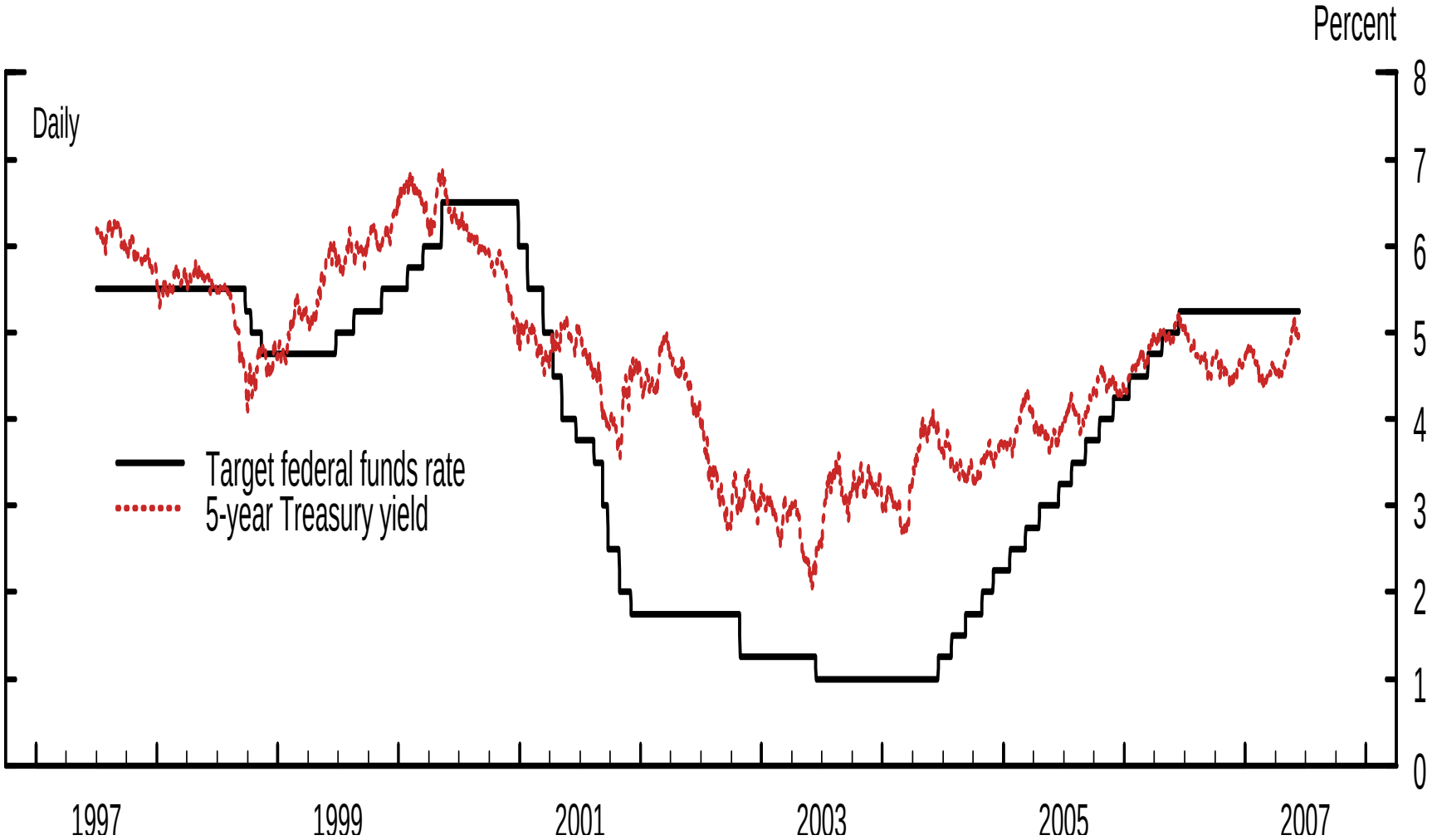
- What is the effect of interest rate changes on bank profitability?
- **Conventional wisdom**: banks benefit from a steep yield curve because they engage in maturity transformation.
  - But banks may hedge interest rate risk
  - Noninterest income/expense may change in response to movements in interest rates
- Empirical literature offers mixed evidence regarding the effects of changes in interest rates on profitability of banking institutions.

  (Flannery [1981,1983]; Flannery & James [1984]; Akella & Greenbaum [1992]; English [2002]; Schuermann & Stiroh [2006]; Den Haan, Sumner & Yamashiro [2007])

Our Paper

- Measure the response of bank stock returns to interest rate surprises associated with monetary policy actions:
  - These surprises are uncorrelated with other economic news.
- Examine how the reaction of bank stock returns to interest rate surprises varies with:
  - Degree of maturity mismatch between assets and liabilities.
  - Reliance on “core deposits.”
  - Usage of interest rate derivatives.
  - Bank size and other characteristics.
- Examine the mechanisms behind the reaction by looking at the accounting measures of profitability and the size and composition of bank balance sheets.

Sample Period



- 84 FOMC announcements between 7/2/97 and 6/28/07:
  - Four intermeeting moves (10/15/98, 1/3/01, 4/18/01, 9/17/01).

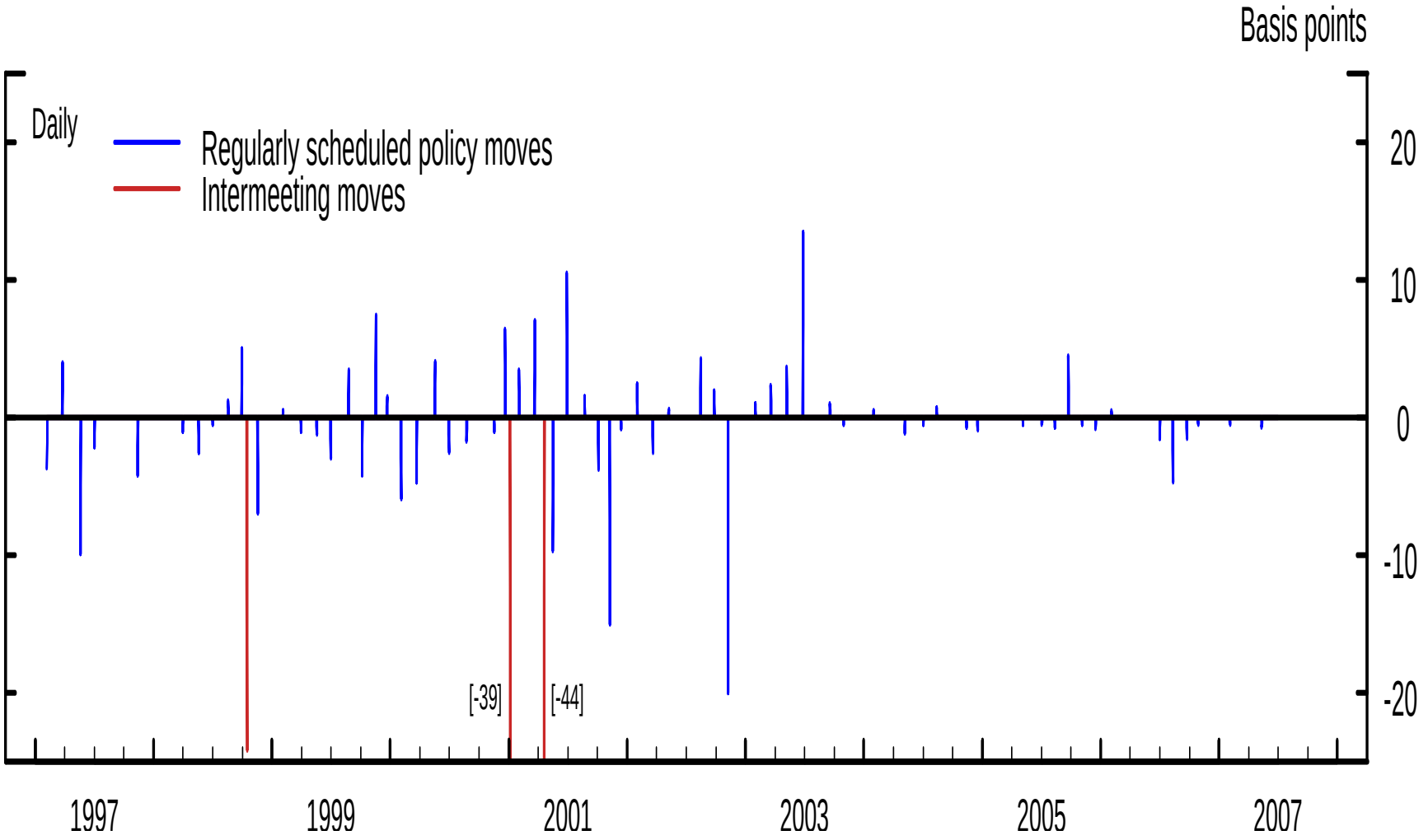
TARGET SURPRISE

- For each FOMC announcement, decompose the change in the target federal funds rate:

$$\underbrace{\Delta ff_t}_{\text{actual}} \equiv \underbrace{\Delta ff_t^e}_{\text{expected}} + \underbrace{\Delta ff_t^u}_{\text{surprise}}$$

  - Δff_t^e measured using federal funds futures quotes over the 30-minute window around the FOMC announcement (Kuttner [2001])
  - **Target Surprise**: $\Delta ff_t^u = \Delta ff_t - \Delta ff_t^e$
    - Unexpected change in the federal funds target rate associated with a specific FOMC announcement.

TARGET SURPRISES

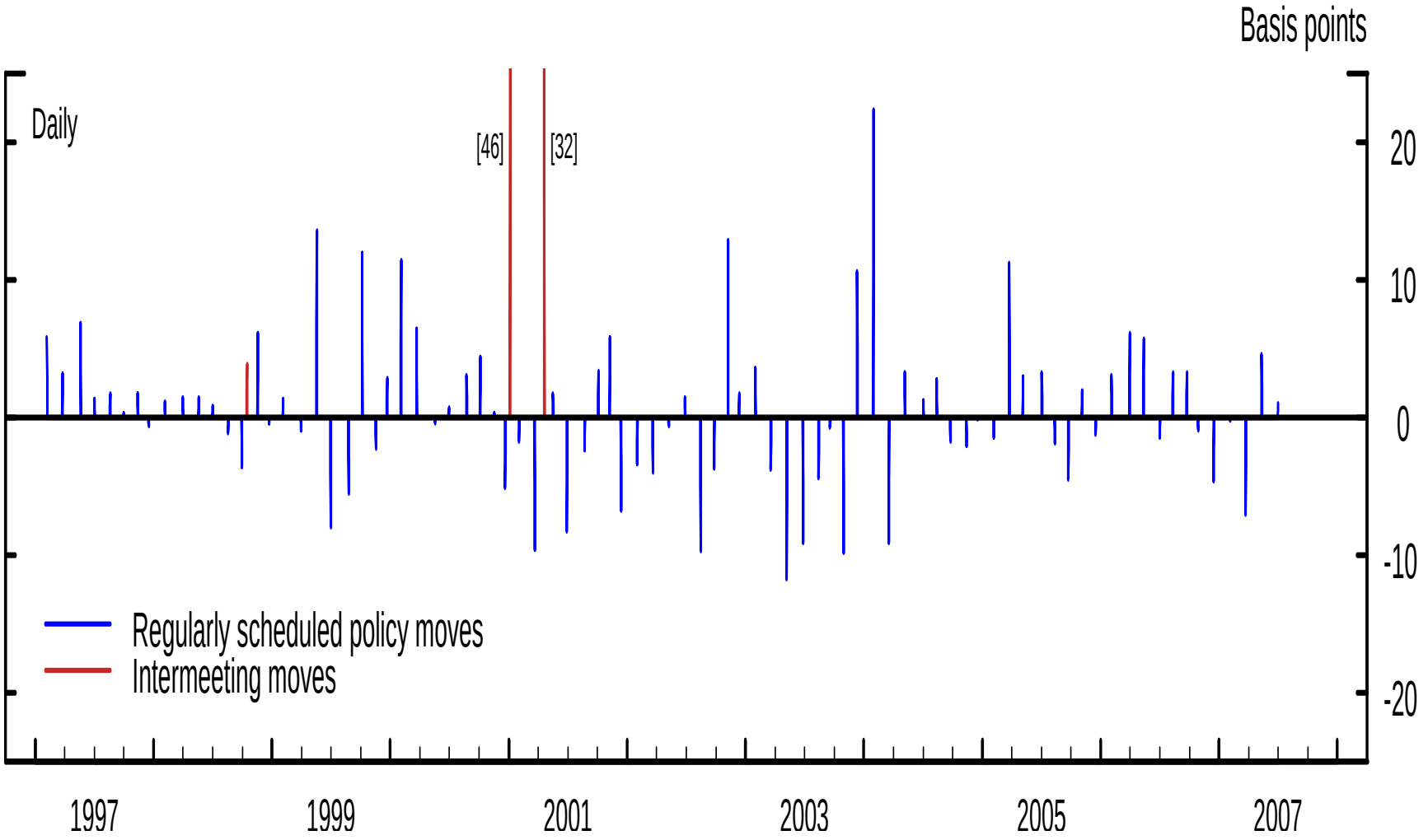


NOTE: Excludes the 9/17/2001 intermeeting policy action.

SLOPE SURPRISE

- Unexpected steepening or flattening of the yield curve.
- **Slope Surprise**: $(\Delta y_t^m - \Delta ff_t^u)$
  - $\Delta y_t^m =$ change in the m-year Treasury yield over a 30-minute window around the FOMC announcement
  - $m = 2$, 5, and 10 years
- Slope surprises can occur when FOMC communication alters the expected path of future short-term interest rates.

5-Year Slope Surprises



NOTE: Excludes the 9/17/2001 intermeeting policy action.

Stock Returns and Interest Rate Surprises

- Intraday stock price quotes for 355 BHCs (Obs. = 11,026).
- $R_{it} =$ (simple) return for bank i over the 2-hour window around the FOMC announcement on day t.
- Baseline specification:

$$R_{it} = \beta_0 + \beta_1 \Delta ff_t^u + \beta_2 (\Delta y_t^m - \Delta ff_t^u) + \beta_3 \Delta ff_t^e + \epsilon_{it}$$

  - Estimated by OLS.
  - Driscoll & Kraay [1998] robust standard errors.
  - Coefficient interpretation:

$$\beta_1 = \frac{\partial R}{\partial \Delta ff^u}\Big|_{(\Delta y^m = \Delta ff^u)} \quad \text{(level surprise)}$$

$$\beta_2 = \frac{\partial R}{\partial (\Delta y^m - \Delta ff^u)}\Big|_{(\Delta ff^u = 0)} \quad \text{(slope surprise)}$$

Reaction of Bank Stock Returns

All FOMC Announcements

Explanatory Variable	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
Level surprise: Δff^u	-8.166***	-8.627***	-10.20***
	(1.458)	(1.584)	(1.962)
Slope surprise: $(\Delta y^m - \Delta ff^u)$	-4.913***	-4.819***	-5.807***
	(1.694)	(1.446)	(1.854)
Expected change: Δff^e	0.617	0.560	0.525
	(0.478)	(0.422)	(0.426)
Constant	0.065	0.085	0.078
	(0.080)	(0.082)	(0.083)
Adj. R^2	0.103	0.102	0.099

NOTE: Robust standard errors in parentheses; *, **, *** denotes significance at the 10%, 5%, and 1% level, respectively.

Measuring the Maturity Mismatch

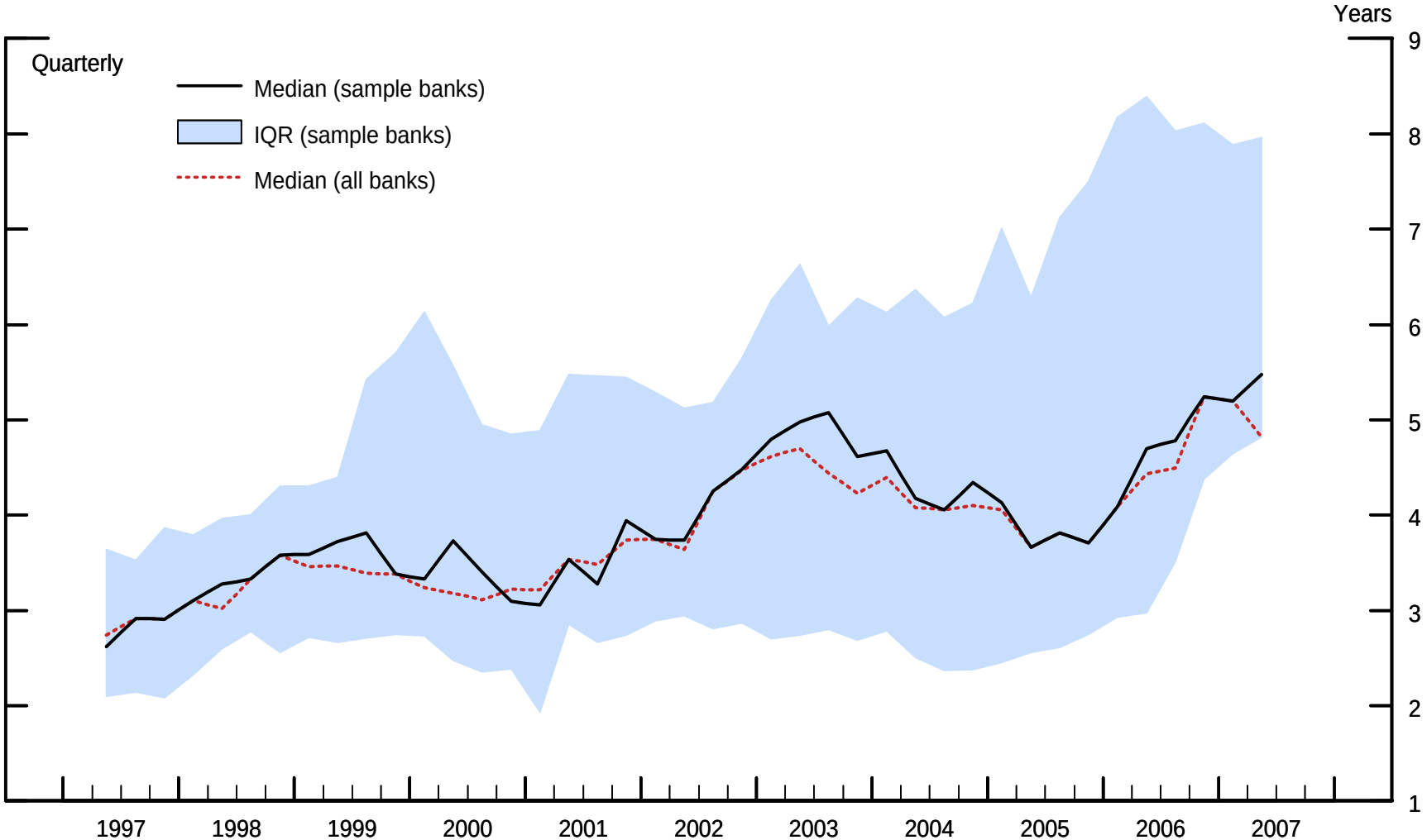
- Call Reports contain information on the repricing time and/or maturity of selected assets and liabilities:

$$GAP_{it}^{RP} = \begin{bmatrix} \text{average} \\ \text{repricing/maturity} \\ \text{of assets} \end{bmatrix} - \begin{bmatrix} \text{average} \\ \text{repricing/maturity} \\ \text{of liabilities} \end{bmatrix}$$

  - Based on 26 asset and 11 liability categories
- Large GAP^{RP} implies greater exposure to changes in the slope of the yield curve.
- GAP^{RP} is not a measure of duration.

Repricing/Maturity Gap

(1997:Q2–2007:Q2)



NOTE: All percentiles are weighted by interest-earning assets.

Stock Returns and Interest Rate Surprises

By Bank Characteristics

- Regression specification:

$$R_{it} = \beta_1 \Delta ff_t^u + \beta_2 (\Delta y_t^m - \Delta ff_t^u) + \gamma_1 \left[GAP_{it}^{R/M} \times \Delta ff_t^u \right] + \gamma_2 \left[GAP_{it}^{R/M} \times (\Delta y_t^m - \Delta ff_t^u) \right] + \theta_1' \left[\mathbf{X}_{it} \times \Delta ff_t^u \right] + \theta_2' \left[\mathbf{X}_{it} \times (\Delta y_t^m - \Delta ff_t^u) \right] + \eta_i + \epsilon_{it}$$

- $\mathbf{X}_{it}$ = vector of bank-specific characteristics
  - A_{it}^{OTH} = other assets (as a share of interest-earning assets)
  - L_{it}^{OTH} = other liabilities (as a share of liabilities)
  - DTD_{it} = demand + transaction deposits (as a share of liabilities)
  - SD_{it} = saving deposits (as a share of liabilities)
  - LNS_{it} = loans & leases (as a share of total assets)
  - $\log A_{it}$ = log of (real) total assets

Reaction of Bank Stock Returns

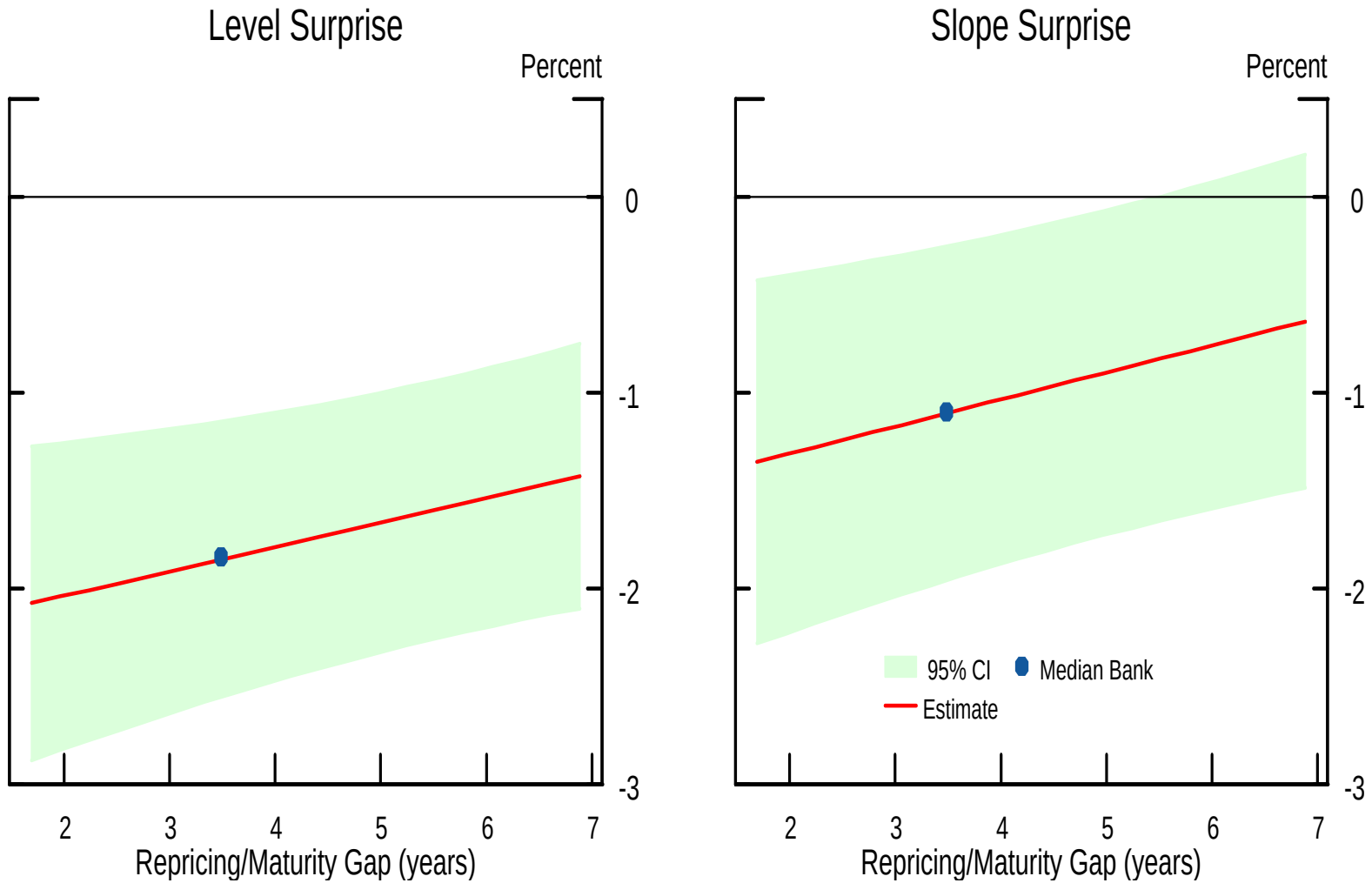
By Repricing/Maturity Gap

Variable $\times$ Interest Rate Surprise	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
$GAP^{R/M} \times \Delta ff^{u}$	0.500**	0.453*	0.598**
	(0.238)	(0.237)	(0.256)
$GAP^{R/M} \times (\Delta y^{m} - \Delta ff^{u})$	0.553**	0.426**	0.521**
	(0.244)	(0.217)	(0.246)

NOTE: Robust standard errors in parentheses; *, **, *** denotes significance at the 10%, 5%, and 1% level, respectively.

Reaction of Bank Stock Returns

By Repricing/Maturity Gap



NOTE: Slope surprise is measured using a 2-year Treasury yield.

Reaction of Bank Stock Returns

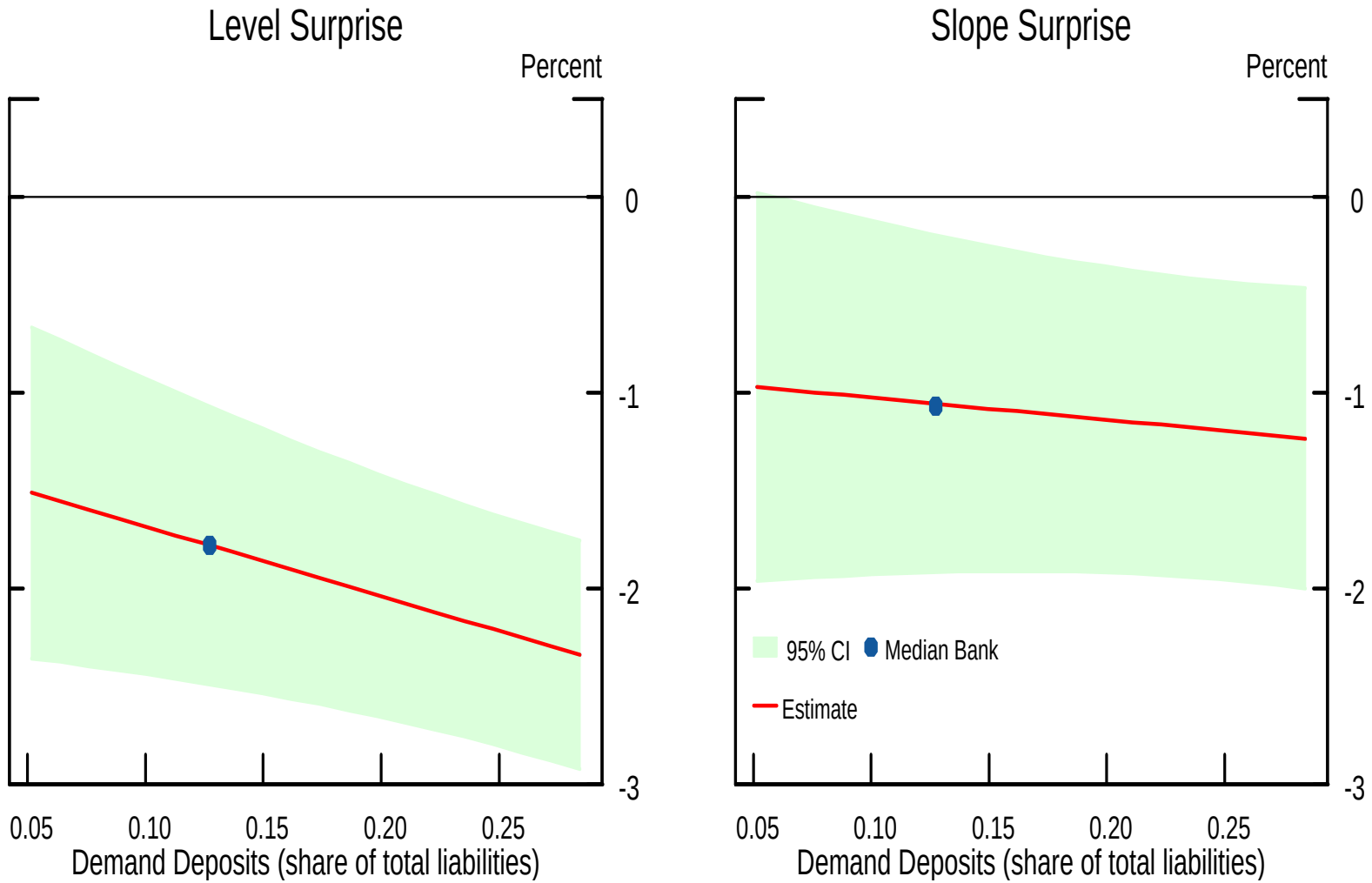
By Reliance on Demand/Transactions Deposits

Variable $\times$ Interest Rate Surprise	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
$DTD \times \Delta ff^u$	-14.27**	-17.80***	-18.58***
	(5.644)	(5.522)	(6.928)
$DTD \times (\Delta y^m - \Delta ff^u)$	-4.516	-8.046	-8.002
	(6.349)	(5.882)	(6.863)

NOTE: Robust standard errors in parentheses; *, **, *** denotes significance at the 10%, 5%, and 1% level, respectively.

Reaction of Bank Stock Returns

By Reliance on Demand/Transactions Deposits



NOTE: Slope surprise is measured using a 2-year Treasury yield.

Reaction of Bank Stock Returns

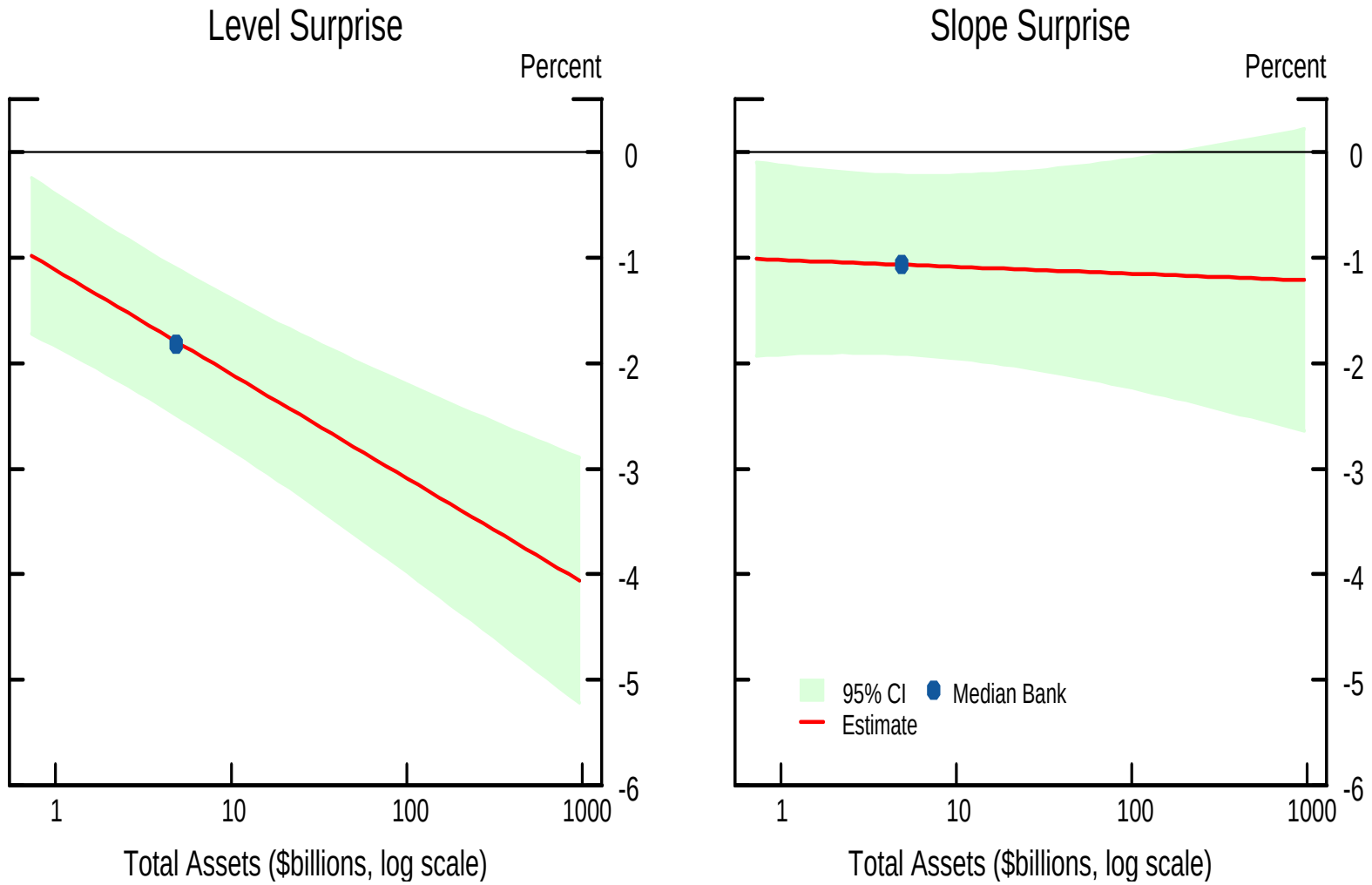
By Bank Size

Variable $\times$ Interest Rate Surprise	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
$\log A \times \Delta ff^u$	-1.714***	-1.766***	-2.035***
	(0.340)	(0.347)	(0.460)
$\log A \times (\Delta y^m - \Delta ff^u)$	-0.111	-0.123	-0.394
	(0.429)	(0.390)	(0.447)

NOTE: Robust standard errors in parentheses; *, **, *** denotes significance at the 10%, 5%, and 1% level, respectively.

Reaction of Bank Stock Returns

By Bank Size



NOTE: Slope surprise is measured using a 2-year Treasury yield.

Conclusion

- Bank stock returns react negatively to
  - Unexpected increase in the level of interest rates.
  - Unexpected steepening of the slope of the yield curve.
- A large maturity mismatch between assets and liabilities mitigates the negative reaction of stock returns to slope surprises.
- Findings are robust to controlling for the usage of interest rate derivatives.
- The reaction of stock returns appears consistent with the adjustment of bank balance sheets and net income in response to interest rate changes.